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U. S. DEPARTMENT OF AGRICULTURE

FARMERS' BULLETIN No. 1554

POULTRY HOUSES *and* FIXTURES



GROWING CHICKS and laying hens need comfortable houses that are dry and roomy, with plenty of fresh air and sunlight. It never pays to overcrowd them.

Detailed information on how to build poultry houses is given in the following pages, so that anyone handy with tools can build them.

PERSONS INTENDING TO BUILD ARE ADVISED TO CONSULT THE POULTRY DEPARTMENT OF THEIR STATE AGRICULTURAL COLLEGE OR STATE EXPERIMENT STATION.

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POULTRY HOUSES AND FIXTURES

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CERTAIN GENERAL PRINCIPLES apply to all poultry-house construction, though local conditions determine to a large extent the exact type which will give best results. Climatic and other conditions vary to such an extent in different parts of the United States that it is impossible to give in this brief treatise a description of the type of house best suited for each locality. This bulletin, therefore, is confined to a discussion of the principles of poultry-house construction. It includes also a plan of a brooder house and one of a laying house.

This type of brooder house, with perhaps slight modifications, should give satisfaction in most parts of the country. The plan of a laying house is suitable for many sections of the country and it serves also to illustrate several principles of house construction.

Plans of houses suitable for conditions in most of the States may be obtained from the State experiment station or State agricultural college.

ESSENTIALS IN HOUSING POULTRY

The first essential in housing chicks or laying hens is comfort, for unless chicks are comfortable they will not grow well and pullets and hens will not lay well. To be comfortable a house must provide plenty of room, be well supplied with fresh air and sunlight, and always be dry.

The second essential is economy. A new house need not be expensive, but it should be durable; the more durable the house the less the cost of housing per year in a period of years. Avoid building cheap, flimsy houses, because they soon have to be replaced.

The third essential is convenience. The house should be conveniently located and should be of such shape and size that work in it can be done with ease. Too often the mistake of building small houses with low roofs is made, so that it is drudgery to care for the chicks or the layers. Since labor is an important factor in the management of poultry, the arrangement of the house for convenience adds greatly to the chances of success.

LOCATION AND SITE

The location should provide good drainage of water and circulation of air, so that the floor and yards will be dry. The house should not be in a low pocket or hollow in which cold air settles. Wherever possible a southern or southeastern exposure should be selected, although this is not so vital if there is good reason for facing the house in some other direction.

Poultry can be raised successfully on any well-drained soil. A light loam which will grow good grass is well adapted for this purpose, whereas a very light, sandy soil through which water leaches freely is best for intensive poultry keeping. A heavy clay or other water-retentive soil is not well adapted to poultry raising, as such land does not drain readily, which makes it much more difficult to keep the stock healthy. Where the soil is of such character the site of the house should be underdrained, and particular care should be taken to see that the house is situated so that all surface water is drained away from it.



FIG. 1.—An open-front type of house on a good site, well-drained land with trees at the north, providing a windbreak

Houses that are protected by trees or other windbreaks (fig. 1) usually give better results than houses which are exposed.

BROODER HOUSES

The houses in which chicks are brooded and reared should be so constructed as to promote the most efficient growth in the chicks. A brooder house should provide ample protection from the weather but should also be well ventilated, because chicks do not do well if brooded in houses where the atmosphere is stuffy. At the same time no direct draft should pass through the house.

The brooder house should provide plenty of room for the chicks, allowing at least 100 square feet of floor space for 300 chicks. For farm flocks, in most cases, the house should be easily portable. Portable houses for colony stove brooders may be built in different sizes and styles, but they should be of sufficient size and height to be convenient to work in while tending the brooder or feeding the chicks. The shed-roof brooder house illustrated in Figure 2 is used with satisfactory results at the United States Animal Husbandry Experiment Farm, Beltsville, Md.

Detailed plans of this brooder house are given in Figures 3 and 4. This house is 10 by 14 feet and will accommodate from 300 to 500 chicks, but best results are obtained when not more than 350 chicks are kept in one flock. It is built on runners to facilitate moving and is as large a house as can be readily moved. The openings on three sides and the ventilating board in the rear under the eaves make the house comfortable for growing chicks in summer. The windows and shutters are hinged at the top and swing out to keep rain from coming in. They may be made of glass substitutes that admit the desirable ultra-violet rays.

These colony brooder houses also provide quarters for the growing chickens if the cockerels are removed at an early age and some of the growing pullets are removed. Larger 2-room houses adapted for the use of small coal-burning brooder stoves can be made on the same



FIG. 2.—A shed-roof type of brooder house with a capacity of about 350 chicks. Used at the United States Animal Husbandry Experiment Farm, Beltsville, Md.

general principles as the colony house, except to double size, making them 20 feet wide by 14 feet deep, with a partition in the middle. One section can be used for brooding and the other for feeding. These larger houses are especially desirable for larger flocks of chicks and for winter or early brooding.

LONG BROODER HOUSES

Long brooder houses are used for hot-water-pipe brooders, which are especially desirable for winter brooding. They are better than the colony houses for the production of broilers if the chicks are marketed at an early age. If long brooder houses are used to raise pullets for egg production, it is better to have the colony houses on

range in which the pullets are grown to laying age after the brooding period is over. This requires two sets of buildings for raising the chickens and adds materially to the investment. They are almost essential for brooding throughout the winter in the northern part of the country. Long brooder houses are also used, to some extent, divided into pens about 16 feet square, each pen being heated with a coal stove such as is used in the colony brooder house.

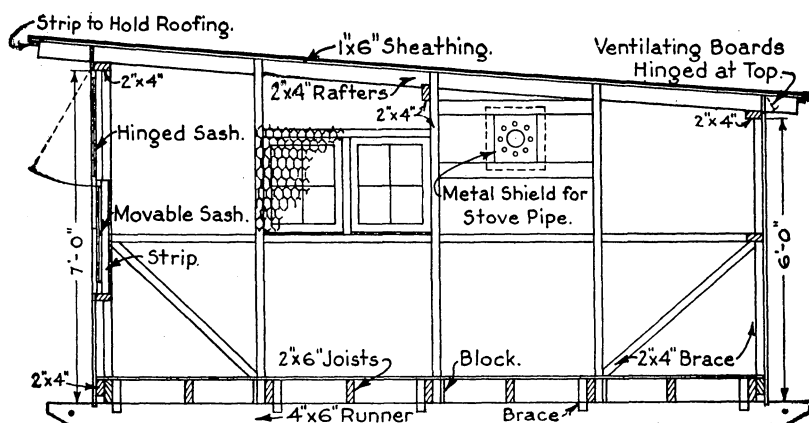
These long, hot-water-pipe brooder houses may be made any desired length, but are usually from 75 to 150 feet long, varying in width from 12 to 25 feet. The house is usually divided into pens from $3\frac{1}{2}$ to 5 feet wide, with an aisle in the rear or north side of the building. A concrete floor should be installed, because it is more sanitary and durable than any other kind. The small, narrow yards attached to the houses may get infected with disease germs. Every care must be taken to keep the yards clean. One method is to extend the concrete flooring about 10 feet in front of the house. If a wire-netting fence is put around the outside concrete yard, the chicks may be kept off the ground for the first weeks to reduce losses from coccidiosis and other diseases. The advantage of having the concrete yard is that the chicks may be allowed outdoors to benefit from exposure to direct sunshine rather than being kept in the house for the first two weeks or longer. Direct sunlight tends to prevent the chicks from getting leg weakness. The windows in front of the brooder house should admit the direct rays of the sun to the houses. Plans of long, stationary brooder houses adapted for the use of the hot-water-pipe brooder system may be obtained from the manufacturer of the system.

Bill of materials used in the construction of the colony brooder house is as follows:

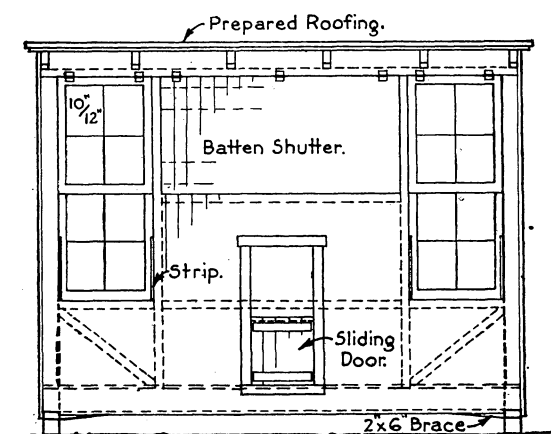
- 2 pieces 4 by 6 inches by 16 feet long, for runners.
- 1 piece 2 by 4 inches by 12 feet long, for studs.
- 5 pieces 2 by 4 inches by 14 feet long, for studs.
- 2 pieces 2 by 4 inches by 16 feet long, for studs.
- 2 pieces 2 by 4 inches by 10 feet long, for braces.
- 3 pieces 2 by 4 inches by 10 feet long, for horizontals.
- 2 pieces 2 by 4 inches by 14 feet long, for horizontals.
- 3 pieces 2 by 4 inches by 10 feet long, for roof plates.
- 11 pieces 2 by 6 inches by 10 feet long, for joists and braces.
- 2 pieces 2 by 4 inches by 10 feet long, for understuds, front and rear.
- 6 pieces 2 by 4 inches by 16 feet long, for rafters.
- 220 feet, board measure, 1 by 6 inches, for roof and fascia.
- 600 feet, board measure, 1 by 4 inches, tongue and groove flooring and siding (including 25 per cent waste).
- 4 single sash, 4 lights, 8 by 10 inch glass.
- 4 single sash, 4 lights, 10 by 12 inch glass.
- 11 pairs 2-inch galvanized hinges.
- 1 pair 6-inch galvanized T hinges.
- 70 square feet 2-inch mesh galvanized poultry wire.
- Metal shield for stovepipe.
- Roof covering for area 180 square feet.
- Nails and paint as required.

The heavy bracing shown in Figures 3 and 4 is essential in any brooder house of this kind which is to be moved on runners. The

brooder stove is placed about two-thirds of the way back from the front of the house and the chimney pipe set so that it goes out through the side of the house and then turns upward, extending above the level of the roof. The chimney may be built to go through the roof directly above the stove, in which case special care must



SECTION



FRONT ELEVATION

FIG. 3.—Section and front elevation of shed-roof stove brooder house, capacity about 350 chicks, used at the United States Animal Husbandry Experiment Farm, Beltsville, Md.

be taken to make the roof water-tight around the chimney. The windows on both sides of this brooder house and the opening for ventilation in the rear wall make this a well-lighted house, and permit good ventilation when the building is used during the summer as a house for growing chickens.

LAYING HOUSES

The size of the flock determines the dimensions of the laying house. For instance, a back-yard flock is usually limited in numbers, and since the floor space required is not very great the house is normally not

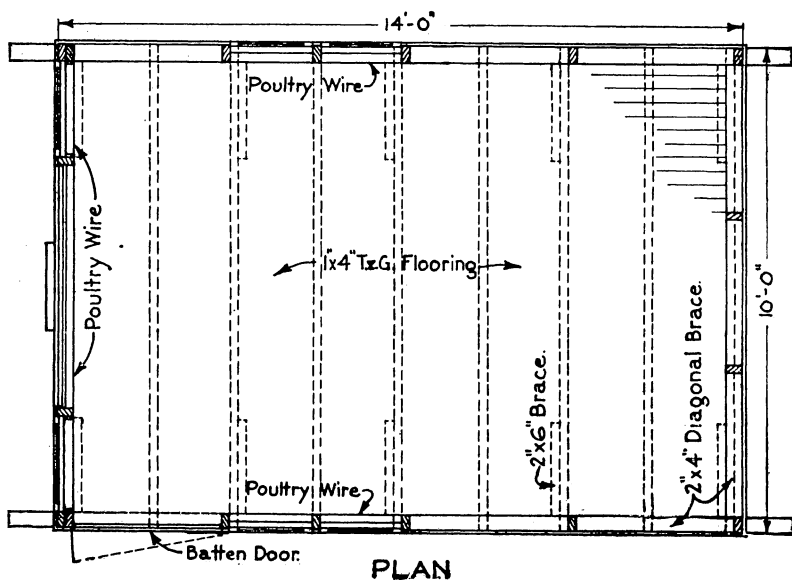
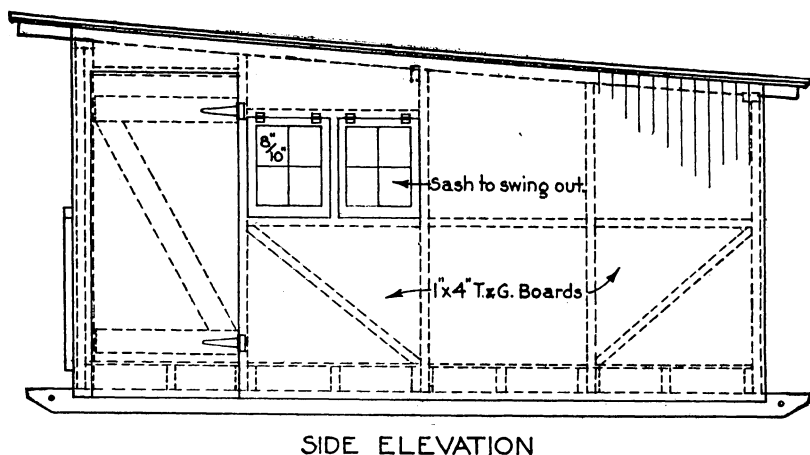


FIG. 4.—Side elevation and plan of colony brooder house, which is built on runners, so that it can be easily moved. (See fig. 2)

more than 12 feet deep, whereas with a large commercial flock the house should probably be about 20 feet deep. On the other hand, in some sections of the country land is cheap enough and climatic and other conditions favorable, so that large flocks are housed in colony houses,

each colony house accommodating from 25 to about 100 birds. In the case of most farm and commercial flocks, however, stationary houses are preferable because of the lower cost of construction, and less labor is required in caring for the birds. In many such cases, however, colony houses are provided for the breeders, while the layers are kept in the stationary houses. The advantages of this system are that the layers may be fed and managed so as to get the maximum fall and winter egg production, while the breeders are given a rest in the fall and then are provided with whatever range is possible before and during the breeding season in order that hatching eggs of the highest quality may be obtained. Stationary houses (figs. 5, 6, and 7) are built either as single units or as long, continuous houses divided into sections. Other desirable houses suitable for different sections of the country are seen in Figures 12 to 15, inclusive.

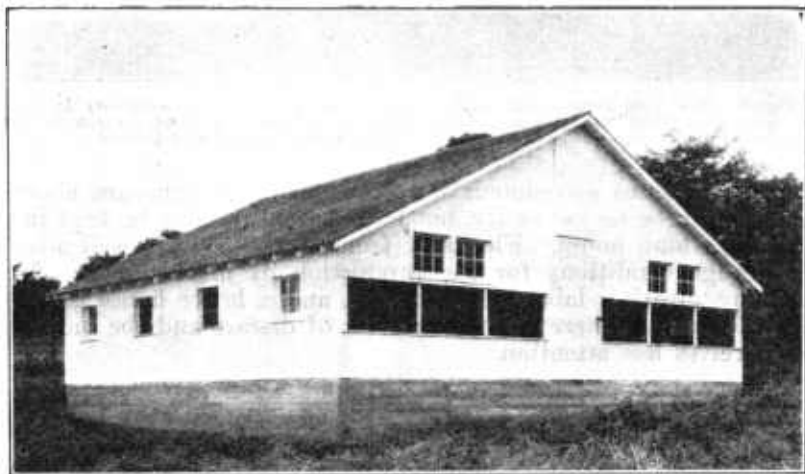


FIG. 5.—A very satisfactory type of house for farm use. The Missouri straw-loft house, 30 feet square, will accommodate from 225 to 300 birds, depending on their size. The same type of house can be built 20 feet square to accommodate 100 hens

CAPACITY OF HOUSES

A house so built that the attendant can stand up and work conveniently will have cubic air space enough if from 3 to 5 square feet of floor space per fowl is allowed. The extent of floor space necessary depends on the housing system employed, size of flocks, weather conditions, and size of the birds. Where the climate is mild and the hens have free range most of the year more birds can be kept on a small floor area under the colony system than under the intensive system. Three square feet of floor space per bird should be allowed with good-sized flocks of Leghorns and 4 square feet with general-purpose breeds, increasing to $3\frac{1}{2}$ square feet for Leghorns and $4\frac{1}{2}$ square feet for general-purpose breeds when flocks are small. On the other hand, in a mild climate, a space of 3 square feet is enough for Leghorns and $3\frac{1}{2}$ square feet for the general-purpose breeds when kept in colony houses with free range.

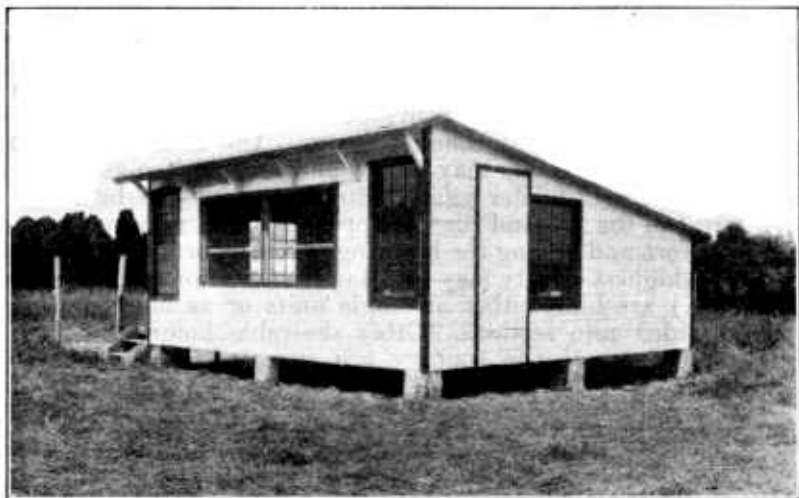


FIG. 6.—The New Jersey unit house, 20 feet square, is very satisfactory in many sections. Glass windows and cotton curtains are used in front, though in New Jersey they are needed but very little. This house is very well lighted

Colony houses accommodating from 30 to 50 hens are about as large as can be moved easily, but larger numbers may be kept in one flock in a long house. Flocks of from 100 to 500 are well adapted to average conditions for the production of market eggs. Large flocks require less labor, fewer fences, and a lower house cost than small flocks, but there is a greater risk of disease and the individual hen receives less attention.



FIG. 7.—A Michigan-type house in which cotton curtains and glass are used in sliding sash

YARDS AND FENCES

Laying fowls should be confined to good-sized yards adjacent to the laying house rather than allowed to roam over the premises, because the layers can be managed more efficiently and they should not be allowed with the cattle and hogs. The value of fresh, sweet land for poultry can hardly be overestimated, and the yards should be large enough so that they can be cultivated and sown to a grass or other green crop.

A good grass sward can be maintained on fertile soil by allowing from 220 to 260 square feet of land per bird (200 to 167 birds to the acre). More space per bird is necessary on poor grassland. A much larger number of fowls is usually kept to the acre on sandy soil, where double yards are used and the land is frequently cultivated. Under this system as many as 1,000 laying hens are sometimes kept on 1 acre, for egg production only, when the stock is not used for breeding and no chicks are raised. A desirable arrangement of yarding, especially where green feed can be grown throughout the year, is to have three yards of equal size for each house, one in front and two in the rear, the rear yards extending beyond the house. The single yard in front makes fewer gates to open and close in going to and from the house. The birds may be alternated from yard to yard and a green crop grown in each yard as soon as it is vacant.

The general-purpose and meat breeds require fences from 5 to 6 feet high, while for Leghorns a fence from 6 to 7 feet high is necessary. To keep Leghorns in, it may help to slant the upper 2 feet of the fence in at an angle of about 30° . A strand or two of barbed wire strung on top of the woven wire is good. It is sometimes necessary to clip the flight feathers of one wing of any bird which persists in getting out. A board or wooden strip along the top of the fence is not advisable, as hens will often fly over.

Posts may be set or driven. They should be from 8 to 10 feet apart for common hexagonal poultry netting or 16 to 20 feet for woven wire. Woven-wire fencing makes a better-looking fence and will last much longer than the common poultry netting. Corner posts should be about 8 inches in diameter, set 4 feet in the ground, and they may be set in concrete or braced, or both. Line posts may be 4 or 5 inches in diameter, set 3 feet in the ground. Creosoting the ends that will be below ground or treating them with some other preservative will make the posts last longer.

DETAILS OF DESIGN

ROOF

The roof should be well constructed and made water-tight. Shingle roofs should have a one-third pitch, while composition or metal roofs may have a smaller pitch or be almost flat. However, the roofs with considerable pitch will last longer than roofs which are nearly flat. Different types of roofs are illustrated in Figure 8.

The shed or single-slope roof (fig. 8, A) is practical for houses up to 20 or more feet in width if a girder and posts support it. A girder is needed only in shed-roof houses wider than 14 feet, except in sec-

tions where there is considerable snow, in which case the space should be reduced to 12 feet. Twenty feet is as wide as is usually used for a house for laying hens, although even wider houses are used successfully. The shed-roof type is practical and easy to build and allows a high front to the house.

The combination or two-pitch roof (fig. 8, B) and the semimonitor roof (fig. 8, E) are adapted for buildings from 16 to 24 feet wide, while either of these styles or the monitor (fig. 8, D) and the gable (fig. 8, C) roofs may be used for wider buildings. The combination roof on a house more than 16 feet wide gives good headroom at a moderate cost, reduces the surplus air space, and makes a good-looking building. The shed-roof type is cheaper but not so good looking.

The semimonitor and monitor types are best for a wide house which has a central alley, as these types allow more sunlight in the house, and are commonly used for large brooder houses. The semimonitor house usually faces south. The monitor type of roof is frequently used on buildings facing east and west. Great care must be taken in both these types of houses to avoid drafts.

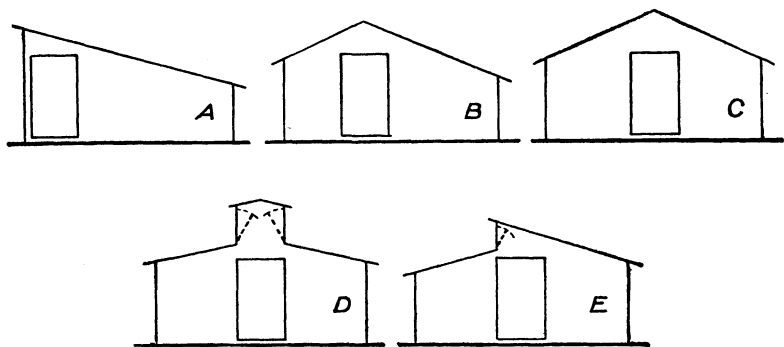


FIG. 8.—Types of roofs of poultry houses. A, shed; B, combination; C, gable; D, monitor; E, semimonitor

The gable roof is used extensively for two-story buildings, for brooder houses, and for incubator cellars. This style of roof is usually ceiled at or slightly above the eaves, or the loft may be filled with straw or some other absorbent material, which tends to keep the house dry and warm. If straw is used there should be an opening in each gable to allow air circulation.

FRONT AND REAR

A house with the entire front open is commonly used in the South. One in which from one-fourth to one-third of the front is curtains and windows is used in the northern part of the United States. Curtains and windows make up from one-third to one-half of the front of the house in the sections between these two extremes. The openings in the front are covered by glass and muslin curtains, so that the amount of open space can be varied according to the season and weather conditions. Glass is most essential in the North, and some glass in the front is desirable in all but open-front houses.

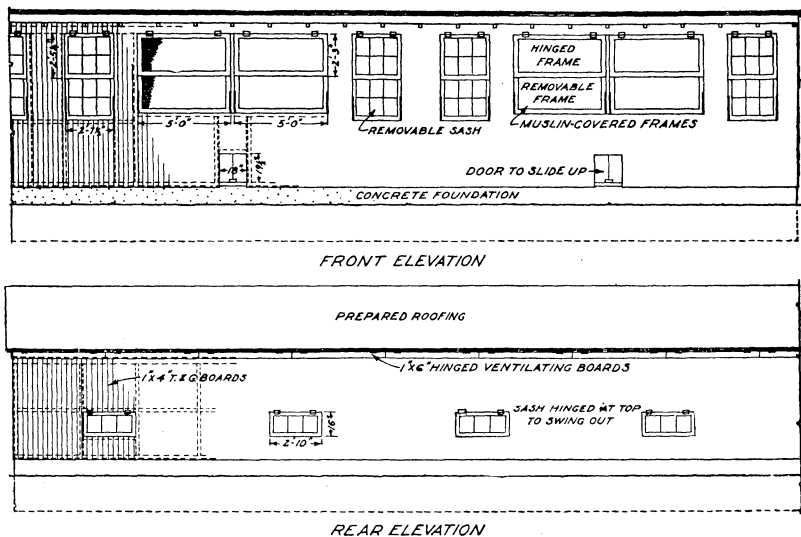


Fig. 9.—Front and rear elevation of shed-roof laying house, 20 by 80 feet, capacity 200 to 250 hens. (See figs. 10 and 11)

The amount of glass or curtain used in the front of the house may be affected by the use of artificial heat in the laying house. Heating laying houses during the cold, winter weather with a hot-water-pipe heating system is practiced by some poultrymen, and in such cases there are usually fewer and smaller curtain openings in the south wall of the house. In case heat is used, the house should be well constructed, so that an even temperature can be maintained readily.

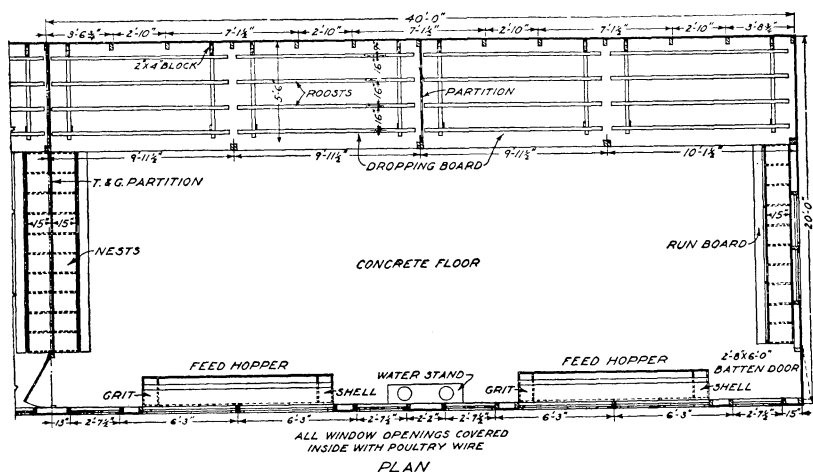


Fig. 10.—Plan of shed-roof laying house shown in Figure 9. This house is 20 feet wide and can be built any length desired

Wooden lowers or inclined slats are used sometimes as wind bafflers in the front of the poultry house, providing an opening through which the air can always circulate without allowing rain to beat into the house. The main objection to these shutters is that they shut out sunlight and are not adjustable.

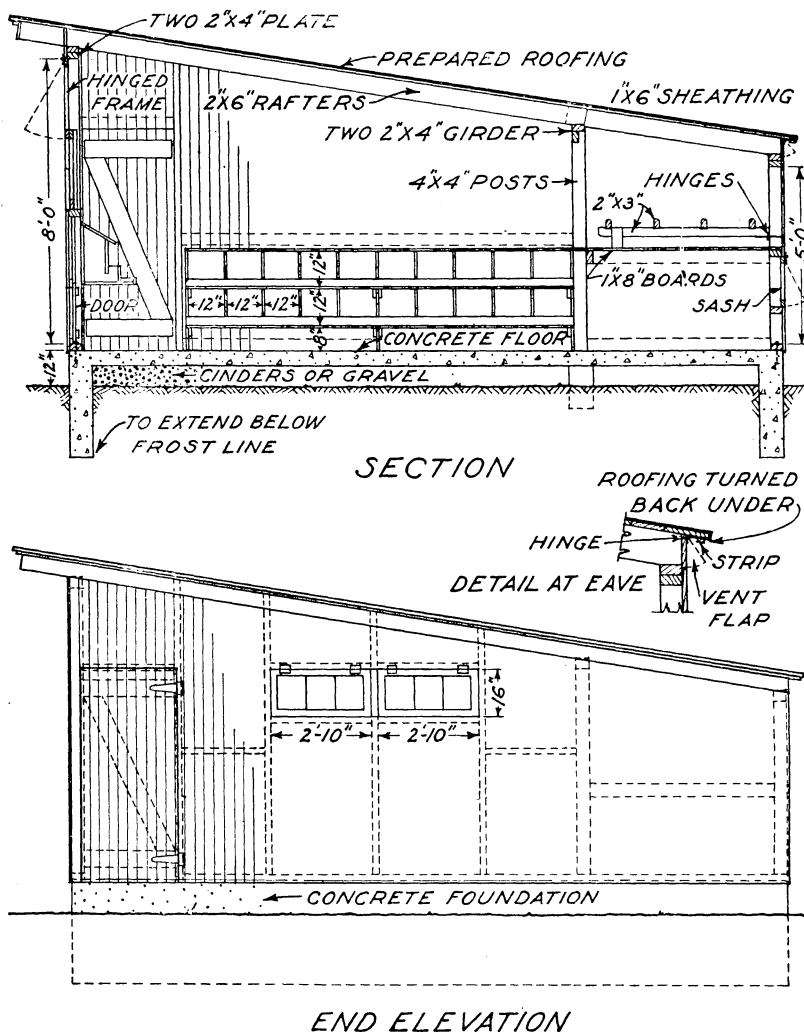


FIG. 11.—Section and end elevation of large shed-roof laying house shown in Figures 9 and 10

Windows in the rear of the poultry house, between the floor and the droppings boards, as shown in Figures 9 and 11, are desirable in wide houses. They let more light in on the floor and help to keep the litter better distributed, as hens always scratch the litter away from the light.

A weather shield from $2\frac{1}{2}$ to 3 feet wide, extending downward like an awning at an angle of 45° from the top of the front, prevents rain from beating into the house. Such shields are particularly good where prevailing rains come from the south.

In order to give extra ventilation in hot weather, in the latitude of Washington, D. C., and all places south of there, an adjustable ventilator opening should be made in the rear of the house. This opening is usually made the entire length of the house, between the plate and the eaves. It must be made so that it can be closed tightly in cold weather. Such an opening is shown in Figures 9 and 11.

A large area of glass in the front of the house makes the house warm during the day and cold at night, as glass radiates heat very rapidly. Unbleached muslin, a light weight of duck cloth, and burlap are used for curtains in the fronts of poultry houses. This cloth should be thin enough to allow a slow circulation of air without a draft, but the object is defeated by using too heavy a grade of duck or by oiling or painting the cloth.

The front of the house should be high enough so that the windows or openings will allow the sun to shine well back into the house in winter. The depth which the sun's rays shine on the floor of the house in the vicinity of Washington, D. C. (latitude 40° N.) on January 1 is given in the accompanying table.

Height of top of windows	Depth of sun- shine	Height of top of windows	Depth of sun- shine
<i>Ft. in.</i>	<i>Ft.</i>	<i>Ft. in.</i>	<i>Ft.</i>
3 6	8	6 2	14
4 5	10	7 1	16
5 4	12	7 11	18

The arrangement of the windows and openings over which duck cloth or burlap is used is a very important matter because they should not only provide for ventilation and proper lighting of the house but they should be so arranged that the greatest amount of direct sunlight has access to the inside of the house when the windows can be opened and the duck cloth or burlap curtains raised. Direct sunlight is very beneficial in keeping the hens in good health and in promoting the efficient use of minerals which the birds consume. The ultra-violet rays of the sunlight do not penetrate glass to any extent and duck cloth or burlap only to a slight extent, so that, whenever possible, without causing drafts, the front of the house should be opened and the windows and curtain openings should be where the maximum amount of direct sunlight may reach the floor of the house. A number of glass substitutes are on the market, but at present sufficient investigational work has not been conducted to determine their efficiency in transmitting ultra-violet rays.

FLOOR

As to what kind of floor is best depends on the size and use of the house, the slope of the land where the house is to be built, and the soil.

Concrete floors usually are the best for long, permanent buildings, brooder houses, incubator cellars, and all permanent or stationary houses. Concrete floors are easy to clean, very sanitary, rat proof, and comparatively inexpensive where gravel and sand are cheap. Keep concrete floors well bedded with straw or some kind of litter, especially in winter, so that they will be dry and not too cold.

Floors may be made of lumber when the floor level is from $1\frac{1}{2}$ to 3 feet above the ground, or where the land is very uneven or sloping. Board floors too close to the ground make rat harbors and soon rot out. They should be high enough from the ground to let dogs under and to permit circulation of air to keep them dry. Portable houses commonly have board floors.

A dirt floor may be used on very light, sandy, dry soils, especially for small, or colony, henhouses. Dirt floors should be from 2 to 6 inches higher than the outside ground surface. It is advisable to



FIG. 12.—A Massachusetts house with good provision for lighting and ventilation. The yards in front enable the house to be used as a breeders' house

take out the old dirt once a year and replace it with fresh sand or fine gravel and earth. Dirt floors not only harbor rats but are very dusty when the hens are scratching vigorously, and the litter does not last nearly so long as on either a concrete or wood floor.

PARTITIONS

Partitions in long laying houses are necessary to break possible drafts; the lower 3 feet of the partitions may be solid and the upper portion wire netting, or solid partitions may be used. Partitions extend across the house every 25 to 40 feet, depending on the length of the house.

There should be solid partitions 20 feet or less apart, extending from the back wall of the house at least as far as the front edge of the droppings boards and from droppings boards to roof. This prevents a draft on the birds when on the roost at night and also keeps the birds from overcrowding in one section of the roost.

ROOSTS AND DROPPINGS BOARDS

The interior fixtures of the pens should be simple, inexpensive, and easy to clean. Roosts and droppings boards may be made removable, but satisfactory results are also secured if they are made permanent, with as few cracks and hiding places for mites as possible. The use of carbolineum (anthracene oil) or a wood preservative of this nature on the roosts and roost supports makes it unnecessary to make the fixtures removable except in the South.

Roosts are usually placed next to the end or back walls, 6 to 8 inches above the droppings boards, while the latter are from 20 inches to about 3 feet above the floor. All roosts should be on the same level; otherwise the birds will crowd and fight to get on the highest. Scantlings 2 by 3 inches or 2 by 4 inches with the narrow surface up and upper edges rounded off make good roosts. By hinging the roosts to the back of the house the droppings boards may be readily cleaned, and this arrangement also makes it easy to properly disinfect both roosts and droppings boards. Seven inches of roost space per fowl should be allowed for Leghorns and 10 inches for Plymouth Rocks or birds of that size, while larger fowls require still more space. As many roosts should be used as are necessary to accommodate the fowls comfortably, two roosts generally being used in narrow houses and three, four, and sometimes five in wide houses. Roosts should be placed about 13 inches apart for Leghorns and 15 inches apart for Plymouth Rocks, but the outside ones may be within 10 inches of the edge of the droppings boards.

It is a good practice to place wire netting immediately beneath the roosts to prevent the hens from picking at the droppings. This prevents the hens from consuming many worm eggs frequently contained in the droppings.

MATERIALS FOR BUILDING

Wood is the cheapest and most commonly used material for building poultry houses. A building constructed of wood can be moved, torn down, or changed more readily than one constructed of hollow tile or concrete. Any durable lumber available may be used. Second-hand lumber or lumber from large packing boxes may be used for building small houses. The lumber for the outside construction should be well seasoned; otherwise the shrinkage will leave cracks in the walls.

Hollow tile makes a good poultry house, and can be bought in some sections at a price which, considering its durability, compares favorably with the cost of wood. This construction is well adapted to incubator cellars and brooder houses or to any buildings requiring double walls and good insulation, though it is not commonly used for small poultry houses because of the higher cost. Houses made entirely of solid concrete are cold and damp.

CONSTRUCTING THE HOUSE

FRAMEWORK

The framework consists of the sills, which support the building; the studs or uprights, which rest on the sills, the plate, which is on top of the studs, and the roof rafters, which rest on the plates.

Wooden floors should be from $1\frac{1}{2}$ to 3 feet above the ground. Concrete floors are laid directly on the ground, though the site should be elevated enough so that there is good drainage away from the building.

The sills are placed on wooden posts, stones, or concrete supports, or directly on top of concrete walls. Wooden posts should be from 6 to 8 inches in diameter, placed 6 to 8 feet apart, and 2 to 3 feet in the ground or below the frost level. Cedar, locust, chestnut,



FIG. 13.—A continuous type of laying house used successfully in many parts of the United States

redwood, and cypress are preferable to most other woods. Concrete posts may be used in place of wooden posts, and are much more durable.

The sills may be either 2 by 4 inches or 4 by 4 inches depending on the size and construction of the building. Sills 2 by 4 inches are heavy enough for colony houses or those of light, single-wall construction if sufficiently supported, while sills 4 by 4 inches are used for larger buildings and for houses with double walls. Sills 4 by 6 inches are used in 2-story henhouses or other large poultry buildings, and should be set on edge, unless on a concrete or stone wall, when a lighter sill may be used and laid flatwise. Concrete walls are commonly used as foundations for large poultry houses, with a 2 by 4 inch sill, which is bolted to the walls. The posts or supports must be set close together if light sills are used.

Runners 3 by 4 inches or 4 by 6 inches are used as sills for portable houses, which require heavy framework. Portable houses which are to be moved on runners must be braced extra well in the corners to stand the strain of moving.

Floor joists may be of 2 by 4 or 2 by 6 inch lumber, depending on the span. They should be from 16 to 20 inches apart. If the span is over 10 feet a center support should be used for 2 by 4 joists.

To square the corners of a poultry house, fix one line or side of the proposed house. With this as a base, locate the other corner posts by using the 6, 8, and 10 foot combination, measuring 6 feet from one end of the fixed line and 8 feet from the same end at right

angles. The angle between the two lines is fixed by a rule 10 feet long running from the 6-foot mark of the fixed line to the end of the 8-foot line, thereby making a square corner. A triangle whose sides are 6, 8, and 10 feet long, respectively, contains a right angle opposite the diagonal side.

The sill in small buildings may be made level by driving a stick at one corner of the house, to which a straightedge or a long, straight stick is nailed at the desired height of the posts or sill. A spirit level is used on this straight edge to make the posts at the right height or to make the sill level. A transit is generally used in laying out large buildings.

The studding is toenailed on the sill and should be set plumb with a spirit level and braced well until sheathed. The studding is set from 2 to 4 feet apart for the rear walls and is placed to fit the windows, curtains, and doors in the front and ends. The studs should be placed so that the lumber will cut with little waste. Less studding is required if the building is boarded up and down rather than horizontally, as in the former case only a few studs with cross studding

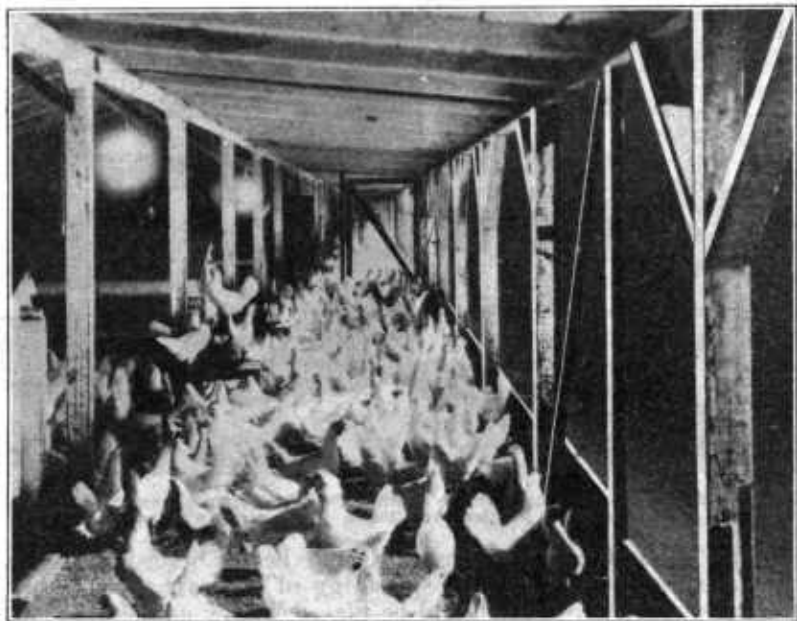


FIG. 14.—House such as is used on the Pacific coast. Note the open front, which is common in many parts of California, though a curtain is frequently used in Oregon and Washington

or ties are required. Studs 2 by 4 inches are commonly used, except that in large houses the corner studs are generally doubled, making them 4 by 4.

Sills and plates are halved or spliced and nailed together at the joints or ends, which should be made over a post or stud. The plates are spiked at the top of the studding and are made of 2 by 4 inch scantling, laid flat on top of the studs, or 4 by 4 made by spiking two 2-by-4s together.

Rafters may be 2 by 4 inch or 2 by 6, the 2-by-4's being used only in light buildings where the clear span is not more than 12 feet and 2-by-6's for longer spans and in climates where roofs have to bear much snow.

It is advisable to use purlins in buildings where rafters are more than 12 feet long. Purlins are usually made of 2 by 4 or 2 by 6 inch material set on edge on posts to support the roof. They are placed lengthwise of the house about midway the length of the rafters, which rest on them. In a deep house which has a wide droppings board the purlin may be placed at the front edge of the droppings board, so that the posts supporting the purlin will not be in the way in the pens. (See fig. 11.)

In roofs that form a ridge a board may be placed between the ends of the rafters to keep the ridge straight and even, but this is not

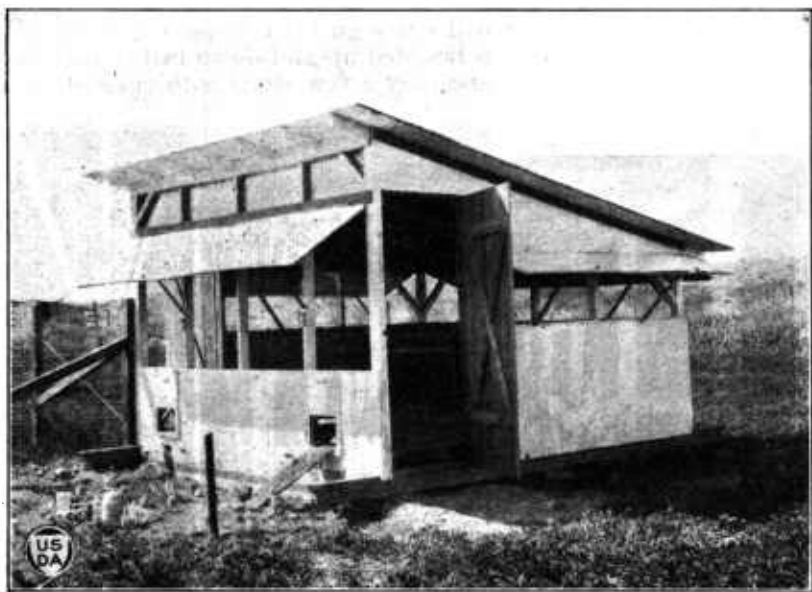


FIG. 15.—A type of house used in the South. The illustration shows the method of providing adequate ventilation during warm weather

necessary in most poultry houses. Collar beams or crossties 1 by 6 inches are used to prevent the spreading of the rafters on gable or combination roofs. They should be placed as low as possible on the rafters, so as to stiffen the frame, but not so low as to interfere with head space. If the hens roost on them, cover the space between them and the rafters with wire netting.

In erecting the rafters one pair may be set in position and the rest marked from these. They should be notched only deep enough to make a snug fit and to provide good nailing on the plates, because deep notching weakens them. Rafters are usually spaced 2 feet apart, from center to center, so that the roof boards will cut with minimum waste.

FLOORS

Most concrete floors are damp and cold and therefore must be heavily covered with litter. This is especially true of concrete floors laid

directly on the ground. It is absolutely essential to keep the floor of the poultry house dry.

The best concrete floors are made by first putting down a firmly tamped foundation of cinders, broken stone, or gravel not less than 6 inches thick and then laying on it from 3 to 4 inches of concrete. A layer of tarred building paper, lapped and cemented with tar at the seams, may be laid between the stone foundation and the concrete to prevent moisture from coming through the earth and concrete and making the floors damp. Care should be taken not to break holes in the paper. Detailed information on the use and mixing of concrete is given in Farmers' Bulletin 1279, Plain Concrete for Farm Use.

Wooden floors, in most parts of this country, are usually made of one thickness of matched flooring. In the extreme northern sections they are generally doubled to make them tight and warm, in which case the lower layer of boards is usually laid diagonally, and building paper is placed between the floors.

WALLS

The walls of most poultry houses are built of siding or flooring nailed directly to the studs. In the North, siding is usually placed over sheathing, making a wall of two thicknesses of boards, with building paper between. Boards 10 to 12 inches in width, placed vertically, with the cracks covered with battens 3 inches wide, are sometimes used for the wall. Matched lumber seven-eighths inch thick placed vertically is used extensively in poultry-house construction and makes a very satisfactory wall without any other covering. Lumber $2\frac{1}{2}$ to 6 inches wide is usually used for this purpose, as wide boards are apt to shrink so much as to leave cracks.

The lowest board on the walls should extend over the top of the sill to cover the joint. A tight joint should also be made at the eaves, either by cutting the rafters off even with the rear wall and covering this joint with good roofing paper or by filling in the space between the rafters with boards. A wide board may be used as the first board on the rafters, allowing it to project from 2 to 4 inches beyond the rear wall, to protect the rear wall of the house. The sheathing should be from 6 to 8 inches wide and should be laid so as to break joints in order to strengthen the building. Siding is usually laid from the bottom upward and also with joints broken. A shutter may be placed just under the eaves on either the outside or the inside of the rear wall for summer ventilation (figs. 9 and 11). The essential point is to have a rear wall which is tight near the roosts, to prevent drafts from striking the birds.

ROOF

Prepared roofing, laid on wide matched sheathing, is ordinarily used for covering the roof. Wooden shingles are used in only a few sections of the country, principally on the Pacific coast. One or two ply roofing material is usually used on the sides, and one, two, or three ply roofing on the roof, the choice varying with different styles and grades of manufacture. This prepared roofing may be had in the form of shingles or in rolls. Directions and materials for laying are supplied with the roofing. The sheathing should be planed on one side and laid close together, with the surfaced side up.

to present a smooth surface for the prepared roofing. Sheathing paper is sometimes used between the sheathing and the roofing material. Prepared roofing may be used on roofs which have a slope of 1 inch or more to the foot.

Such roofing will last longer on a roof which has considerable slope than on a roof which has only a slight slope. A shed roof is the easiest one to cover with prepared roofing, which lasts especially well on this type of roof because it has a northern exposure and is not so much affected by the sun. The best way to fasten the loose ends of roofing paper is to bend them under the sheathing, fastening the paper with a narrow board. (Fig. 11.)

Wooden shingles may be laid from 4 to 5 inches to the weather on roofs which have at least a one-third pitch, which is a rise of 8 inches to the foot, or a total height equal to one-third of the span of a gable roof or two-thirds of the span of a shed roof. Cedar and cypress shingles are usually laid not more than 5 inches to the weather on walls, and are not generally used on roofs which have a rise of less than 8 inches to the foot. Wooden shingles should be laid on narrow sheathing 3 to 5 inches wide, or on common sheathing, and should break joints at least 1 inch and as much more as possible. The sheathing boards should be spaced about 3 inches apart to allow the roof to dry out quickly. Four bundles of wooden shingles are the equivalent of 1,000 shingles 4 inches wide, and estimates are made on this basis. One thousand shingles laid $4\frac{1}{2}$ inches to the weather will cover about 125 square feet, depending on their size.

ESTIMATING MATERIALS REQUIRED

Lumber comes in even lengths, usually 10, 12, 14, and 16 feet long. It is figured at so much per 1,000 feet board measure (b. m.), which means the number of square feet which the material would cover if it were 1 inch thick. The number of feet, board measure, in dressed lumber is based on the size of the lumber before it is dressed. The width of matched flooring is usually based on the width of the board before it is dressed and before the tongue and groove have been made. To compute board measure, multiply the width in inches by the thickness in inches, and multiply this by the length in feet, and then divide this result by 12. The accompanying table shows the number of feet, board measure, in lumber from 6 to 16 feet long, with a cross section varying from 4 to 16 square inches.

Table of board measure

Length	Area of cross section					
	4 inches	6 inches	8 inches	10 inches	12 inches	16 inches
	Board measure					
<i>Feet</i>	<i>Ft. in.</i>	<i>Feet</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Feet</i>	<i>Ft. in.</i>
6	2 0	3	4 0	5 0	6	8 0
8	2 8	4	5 4	6 8	8	10 8
10	3 4	5	6 8	8 5	10	13 4
12	4 0	6	8 0	10 0	12	16 0
14	4 8	7	9 4	11 8	14	18 8
16	5 4	8	10 8	13 4	16	21 4

Boards less than 1 inch thick are usually sold by the square foot, the price depending on the thickness of the lumber. In estimating lumber an allowance should be made for waste, adding one-seventh for common sheathing, one-fifth for matched lumber 6 inches wide, one-fourth for matched siding or lumber 4 inches wide, and one-third for matched flooring $3\frac{1}{4}$ inches wide.

If a working plan or blue print of the poultry house is not available, one should be drawn, using a convenient scale, about one-fourth inch to the foot, showing the ground plan, the front elevation, and the end or a cross section of the house. The bill of materials can be worked up from the drawings.

Wire nails are generally preferred in construction, as they are easier to use than cut nails, although the latter have greater holding power. Use 10 to 20 penny nails for framing, 8 to 10 penny for sheathing, 8-penny for siding, and 6-penny finish or casing nails for clapboarding. Four-penny nails are $1\frac{1}{2}$ inches long, 6-penny are 2, 8-penny are $2\frac{1}{2}$, 10-penny are 3, and 20-penny are 4 inches long. It takes about 5 pounds of 4-penny nails to 1,000 shingles, 18 pounds of 6-penny for 1,000 square feet of beveled siding, 20 pounds of 8-penny and 25 pounds of 10-penny for 1,000 square feet of sheathing, 30 pounds of 8-penny for 1,000 square feet of flooring, and 15 pounds of 10-penny and 5 pounds of 20-penny for the studding in 1,000 square feet of frame wall.

A cubic yard of 1:3:5 concrete will take 4.64 sacks of cement, 0.52 cubic yard of sand, and 0.86 cubic yard of gravel. A cubic yard of 1:2 mortar surface will take 13.48 sacks of cement and 1 cubic yard of sand. A concrete wall can be made entirely of rough concrete, making the wall 6 inches wide and at least $2\frac{1}{2}$ feet high, the top of the wall being level with the top of the floor. The bottom of the wall should go below frost depth.

PAINT AND WHITEWASH

Paint adds greatly to both the appearance and durability of all buildings and appliances. All surfaces should be clean and dry before they are painted. Use a priming coat made of about equal parts of paint and linseed oil and cover with one or more coats of paint, which should be thoroughly brushed into the wood.

Whitewash is cheap and may be used both inside and out. It is made by slaking quicklime in water. The lime should be placed in a vessel and water poured over it, covering the vessel with cloth or burlap, and allowing the lime to slake for one hour. Water is then added to bring the whitewash to a consistency which may be applied readily. Whitewash is spread lightly over the surface with a broad brush, or may be put on with a spray pump.

Interior whitewash may be made in the following manner: (1) Slake 1 bushel of quicklime with 15 gallons of water; (2) beat $2\frac{1}{2}$ pounds of rye flour in one-half gallon of cold water and then add 2 gallons of boiling water; (3) dissolve $2\frac{1}{2}$ pounds of common rock salt in $2\frac{1}{2}$ gallons of hot water; mix (2) and (3), then pour into (1), and stir until thoroughly mixed.

A whitewash for exterior surfaces may be made as follows: (1) Slake 1 bushel of quicklime with 12 gallons of hot water; (2) dis-

solve 2 pounds of common salt and 1 pound of sulphate of zinc in 2 gallons of boiling water; pour (2) into (1), then add 2 gallons of skim milk, and mix thoroughly. Detailed information on painting and whitewash will be found in Farmers' Bulletin 1452, *Painting on the Farm*.

ARTIFICIAL LIGHTS

The use of artificial lights in laying houses during the winter months has become a common practice on many poultry farms, especially on the commercial farms in the northeastern section of the country and on the Pacific coast. The use of artificial lights does not increase the annual production of eggs so much as it increases the proportion of eggs laid during the fall and winter months, when egg prices are relatively the highest. The lights are used from about the first of November to the latter part of March.

Experimental work has shown that a good lighting unit is a 40-watt lamp. It should be fitted with a reflector about 16 inches in diameter and the light should be suspended about 6 feet from the floor. This height is necessary in order to light the roosts well; otherwise some of the birds will not leave the roosts until daylight. Place the lights about 10 feet apart; if the poultry house is 20 feet long, two good lights should be sufficient.

The lights can be turned on by hand or automatically, for which purpose special clocks are made. A local electrician should know how to install the lights and set the clock, as well as to make sure that all connections and wiring are safe.

FIXTURES AND EQUIPMENT

A laying house is not complete without fixtures and equipment of various kinds. Fixtures should always be durable and well adapted for the purpose intended. Avoid an excessive use of fixtures; otherwise they will obstruct too much light and tend to make the house much more difficult to keep clean.

NESTS

Nests may be placed on the partition or end walls, but should be high enough above the floor so that the fowls can work under them. They should also be arranged so that the hens can get into them easily. The nests should not be placed under the droppings board if there is any other place where they can be arranged, as placing them there makes the space under the droppings boards dark and makes the nests more likely to get dirty and more subject to infestation with insects. The nests should be from 12 to 14 inches square, depending on the size of the hens, about 12 inches high, with a strip about 4 inches high on the open side to retain the nesting material. One nest should be provided for every four or five hens.

It is highly advisable to have darkened nests built out from the wall so that the birds enter the nests from the rear, the front of the nests being made of a long door which can be opened for gathering the eggs. (Fig. 16.) The advantage of using darkened nests is to prevent the egg-eating habit.

The use of trap nests is essential in breeding poultry for both egg production and exhibition where pedigree records are used in select-

ing either the males or females. Trap nests are of value in weeding out poor layers and increasing the average egg yield of a flock by selecting and breeding, but are not generally used on account of the large amount of labor required to operate them. The use of trap nests enables the poultry man to learn more about the qualities of good and poor layers than can be done in any other way. Some poultry breeders trap nest their pullets during their first six months of laying and use this as a basis in selecting their breeders for egg production.

One trap nest should be provided for every 4 hens kept in flocks of 50 or more, and one for about every 3 hens in smaller flocks. There are several styles of trap nests that give satisfaction. Several manu-

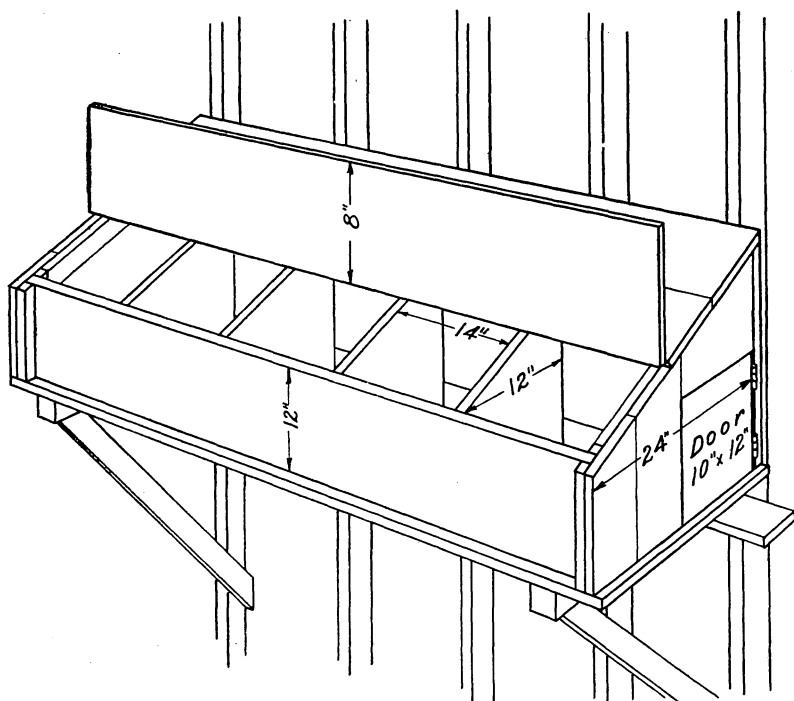


FIG. 16.—Simple, convenient, and practical wall nests, so arranged that hens enter from the rear. The door is opened for gathering eggs; otherwise the nests are dark, which tends to prevent the egg-eating habit from developing. The front board is removable for cleaning the nests

facturers of trap nests sell the fronts separately, so that by purchasing them it is a very simple matter to make the nest and attach the trap to it.

DRY-MASH HOPPERS

Dry-mash hoppers should be so constructed as to hold a sufficient quantity of mash to last for at least a few days, and they should also avoid any wasting of the mash. The hopper should be large enough to afford plenty of feeding space for the members of the flock; a hopper which allows the hens to eat from both sides should be 1 foot long for every 10 birds. One of the most satisfactory indoor dry-mash hoppers is shown in Figures 17 and 18. A satisfactory type of outdoor hopper is shown in Figures 19 and 20. It should be moved frequently, however, or it may become a harbor for rats.

GRIT AND OYSTER-SHELL HOPPERS

A simple and convenient type of hopper that may be used either for grit or oyster shells is shown in Figure 21. The grit or shell is easily accessible and the hopper can be located in any convenient place.

DRINKING STANDS

The drinking vessels for water and skim milk should be supported on a platform about 12 to 18 inches off the floor. Such an arrangement tends to keep the drinking vessels and contents in a much more sanitary condition. The platform should be large enough for the the birds to stand on it comfortably while drinking, and it should be made of slats, so that droppings will not accumulate. (Fig. 17.) In

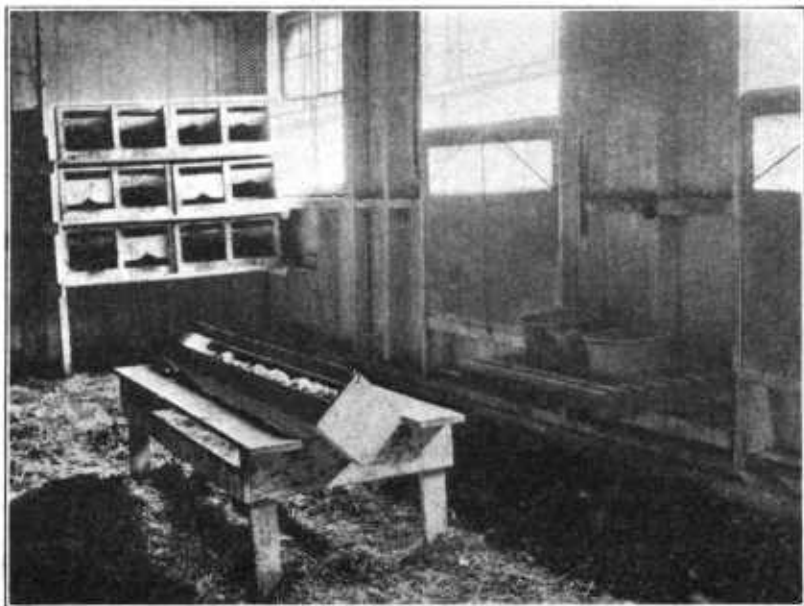


FIG. 17.—A good dry-mash hopper for laying hens. Note also the drinking stand at right and trap nests in rear

sections of the country where the water does not freeze in winter water hydrants and troughs are installed inside the house, and the flow is so arranged that by allowing the water to run a drop at a time the fowls are insured a continuous supply of fresh water. This arrangement is a great saver of labor; in fact, few poultry men realize the amount of labor annually required in watering a flock of chickens.

BROODY COOPS

A suitable place to "break up" broody hens is necessary on a poultry plant. It may be quite simple in design, but should be so arranged that the broody hens can be fed and watered regularly, and the bottom of the coop should be made of slats so that air will circulate freely beneath the hens. A good style of broody coop is illustrated in Figure 22, and can be placed on the inside of the house in the North and on the outside in the South.

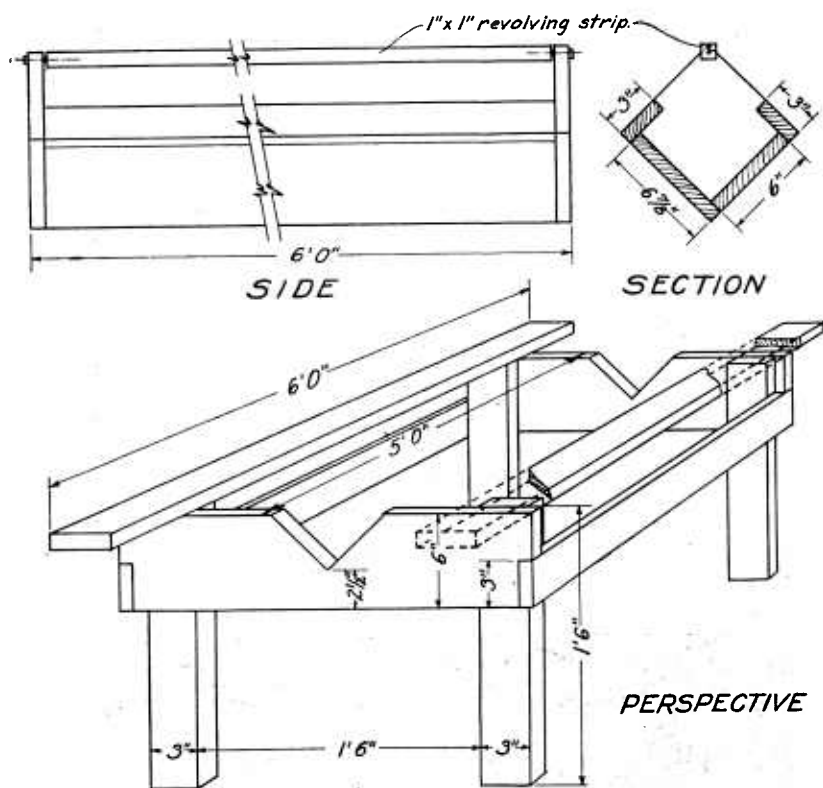


FIG. 18.—Plan of dry-mash hopper shown in Figure 17

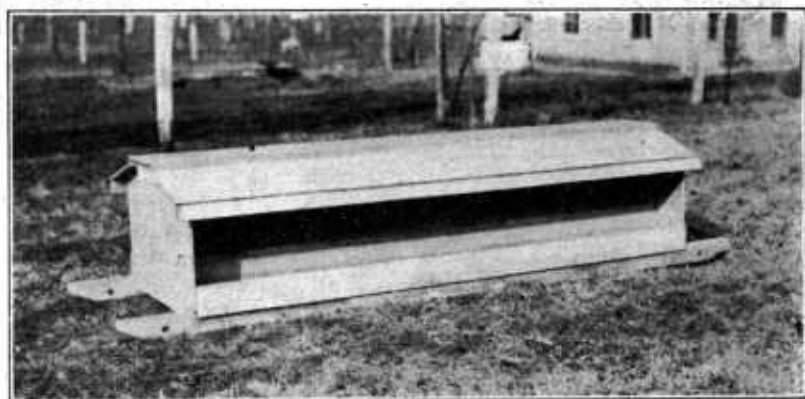


FIG. 19.—An outdoor dry-mash hopper

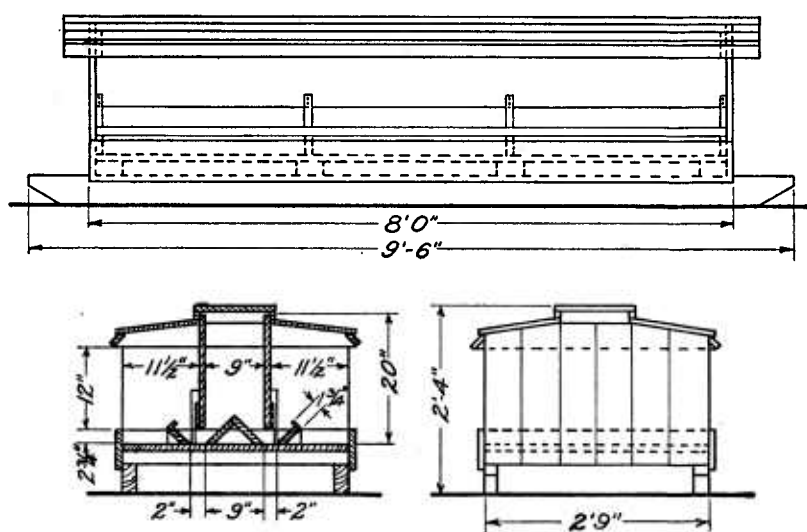


FIG. 20.—Cross section of dry-mash hopper as shown in Figure 19

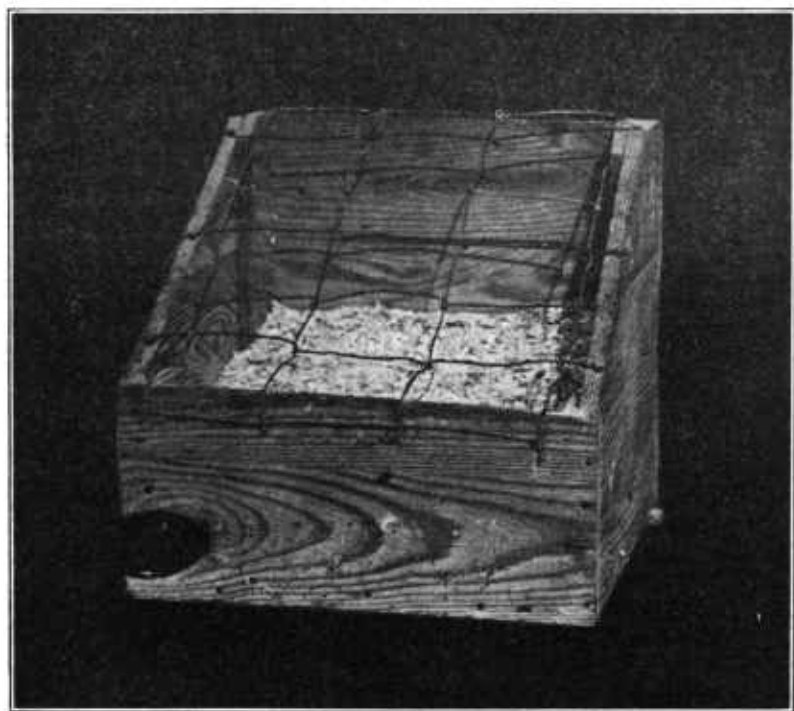


FIG. 21.—A hopper for grit or oyster shells

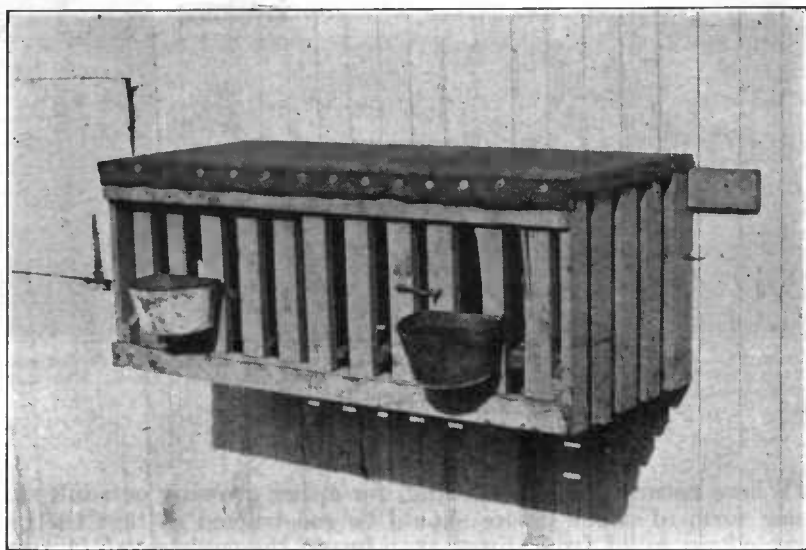


FIG. 22.—A convenient broody coop for use inside or outside the laying house. The bottom is made of 1-inch slats running lengthwise with 1-inch space between them to allow droppings to pass through and to allow air to circulate under the body of the broody hen

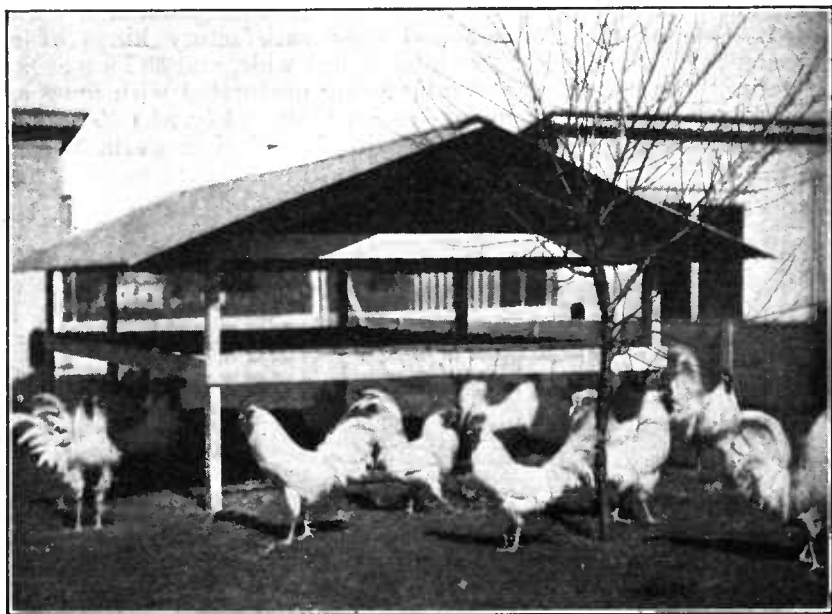


FIG. 23.—A good shade device for hot weather



FIG. 24.—A very simple arrangement for sprouting oats. The oats are turned with a shovel. The bottom of the table is perforated with half-inch holes. The stove is used to maintain a temperature of about 70° F.

SHADE DEVICE

Where natural shade is lacking, for either growing or adult stock, some form of shade device should be constructed so that the birds may obtain relief from direct exposure to the sun's rays. A simple and satisfactory shade device is shown in Figure 23.

OAT SPROUTER

There are a number of devices on the market for sprouting oats, and some of them have given satisfaction, though many of them involve too much labor if a quantity of oats is to be sprouted or germinated. One of the simplest and most satisfactory kinds of oat sprouter is a table about 2 feet high, 2 feet wide, and as long as may be desired, the bottom of the table being perforated with holes and the sides of the table being about 4 inches high. (Fig. 24.) The quantity of oats required for a day's feeding is soaked in warm water in

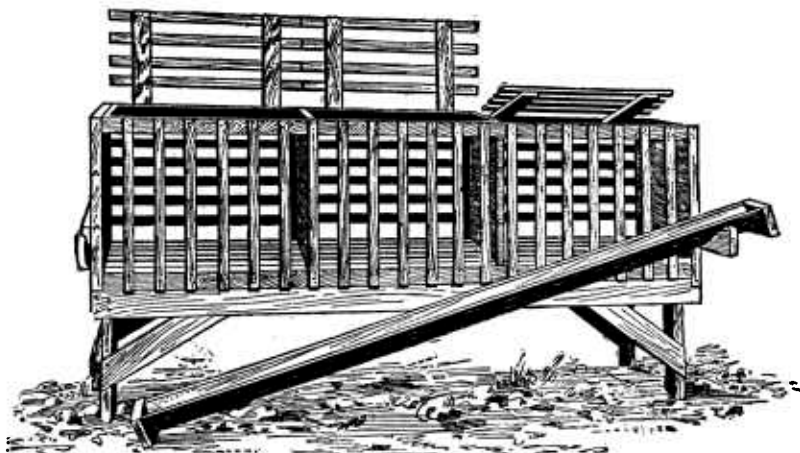


FIG. 25.—A satisfactory fattening crate for farm use

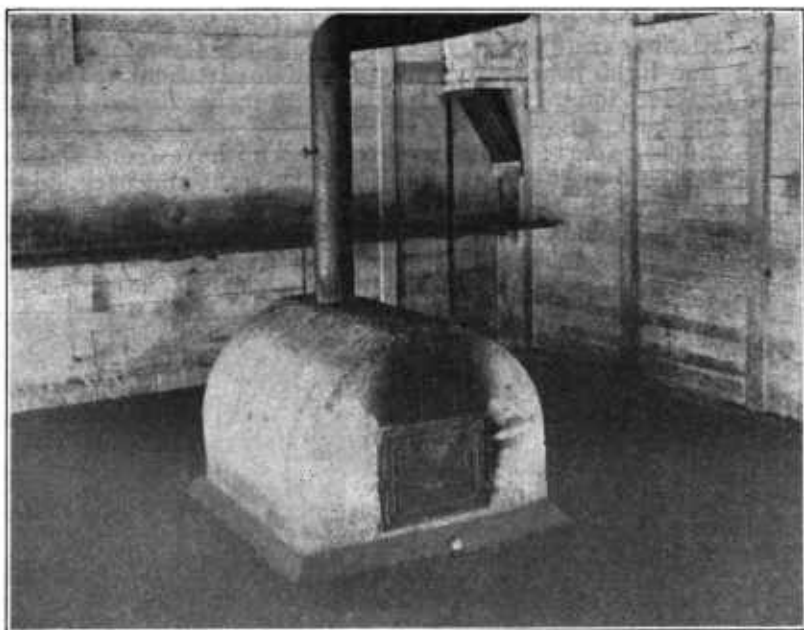


FIG. 26.—At large poultry plants an incinerator provides a satisfactory way of disposing of dead birds. The incinerator shown above is 3 by 3 feet and $2\frac{1}{2}$ feet high at center. There is a small draft door beneath the larger door

a sack for 24 hours and then emptied on to one end of the table and spread out to a thickness of 2 to 3 inches. From day to day the oats are turned over with a shovel and watered, moving each day's supply

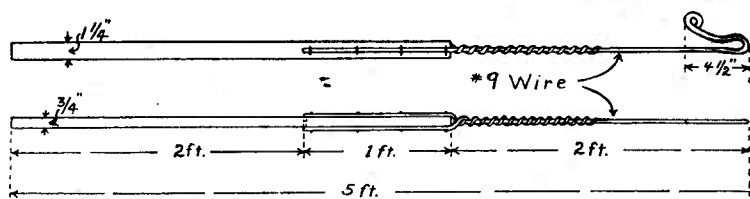


FIG. 27.—Working plan of catching hook

along the table until they reach the lower end, when they are taken out to be fed. The table should be kept in a room where the temperature is about 70° F.

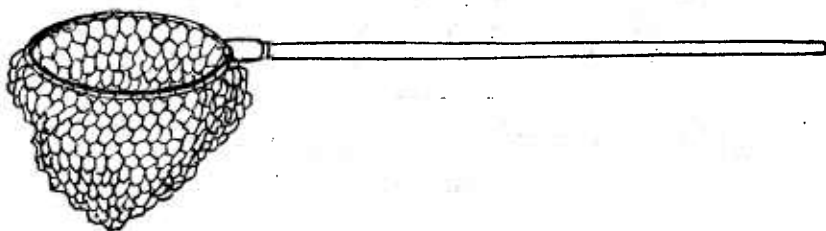


FIG. 28.—A catching net

FATTENING CRATES

The fattening crate is made of laths nailed to a stout framework, with a few light boards for the ends and partitions. The crate should be 6 feet long, 18 inches wide, and 18 inches high. The laths on the top, back, and bottom run lengthwise of the crate and are placed 2 inches apart; care should be taken to have front and back slats on the bottom at least 1 inch from the front and back sides of the crate, so that droppings may pass through and not accumulate. The laths on the front of the crate run up and down and are placed 2 inches apart, so that the fowls may eat from the trough. A V-shaped



FIG. 29.—A satisfactory crate for culling laying-hens. Note the slide doors on the top and at each end

trough 3 inches deep and 5 inches wide at the top is placed on brackets which are placed 4 inches from the bottom of the crate. The crate should stand on legs about 3 feet high. (Fig. 25.)

INCINERATOR

On poultry plants carrying several hundred birds usually a sufficient number of chicks and adult birds die each year to make it advisable to have an incinerator. A very simple and serviceable style of incinerator is shown in Figure 26. Other useful articles of equipment are a catching hook (fig. 27), a catching net (fig. 28), and a crate for use in culling laying hens (fig. 29).

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